

## REPORTE DE CASO

# Enteric fever in a young man with bowel wall thickening and hepatosplenomegaly

## Fiebre entérica en un hombre joven con engrosamiento de la pared intestinal y hepatoesplenomegalia

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### Authors contributions

AKZ provided the patient's medical care; WC provided the computed tomography study; DS and AAFM conceived the manuscript; DS and DAHP wrote the draft manuscript. All authors critically reviewed the manuscript for relevant intellectual content. All authors have read and approved the final version of the paper.

### Conflict of interests

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### ABSTRACT

Typhoid fever (enteric fever), caused by *Salmonella enterica* subsp. *enterica* serovar Typhi (S. Typhi), is a public health problem especially in South Asia and sub-Saharan African countries, while incidence remains low in most other parts of the world, where the disease is primary related to recent travel to endemic countries or contact with chronic carriers. The diagnosis of typhoid fever is challenging in endemic countries, often also low- and middle- income countries (LMIC), due to the poor sensitivity/specificity of available serologic tests and lack of adequate infrastructure for blood cultures. We report the case of an 18-year-old male patient with a 21-day history of right-sided abdominal pain, malaise, headache, intermittent fever and watery diarrhea. Contrast-enhanced abdominal computed tomography (CT) exhibits thickening of the terminal ileum, cecum and ascending colon with mesenteric lymphadenopathy. Laboratory findings indicate elevated transaminases, positive blood culture to S. Typhi and a positive Widal test to S. Paratyphi A, B and S. Typhi H (flagellar) antigens. A diagnosis of complicated typhoid fever was made. Following a 13-day regimen of ceftriaxone, all symptoms resolved. Few reports have been made about CT manifestations in patients with typhoid fever. While CT can aid in diagnosis, it is particularly important for identifying complications of typhoid fever such as perforation, bleeding and abscess formation.

**Keywords:** Typhoid fever; *Salmonella typhi*; Tomography, X-ray computed (source: MeSH NLM).

### RESUMEN

La fiebre tifoidea (fiebre entérica) causada por *Salmonella enterica* subsp. *enterica* serovar Typhi (S. Typhi), es un problema de salud pública, especialmente en el sudeste asiático y en países del África subsahariana, sin embargo, la incidencia sigue siendo baja en la mayoría de otras partes del mundo, donde la enfermedad está principalmente relacionada con viajes recientes a países endémicos o contacto con portadores crónicos. El diagnóstico de la fiebre tifoidea es desafiante en países endémicos, los cuales suelen ser países de ingresos bajos y medios (LMIC), debido a la baja sensibilidad/especificidad de las pruebas serológicas disponibles y la falta de una infraestructura adecuada para los cultivos sanguíneos. Presentamos el caso de un paciente masculino de 18 años con una historia de 21 días de dolor abdominal en hemiabdomen derecho, malestar general, cefalea, fiebre intermitente, y diarrea acuosa. La tomografía computarizada (CT) abdominal con contraste mostró engrosamiento del íleon terminal, el ciego y el colon ascendente con linfadenopatía mesentérica. Los hallazgos de laboratorio indicaron transaminasas elevadas, cultivo de sangre positivo para S. Typhi y un test de Widal positivo para los antígenos A y B de S. Paratyphi, y el antígeno H (flagelar) de S. Typhi. Se realizó diagnóstico de fiebre tifoidea complicada. Después de un régimen de ceftriaxona durante 13 días, todos los síntomas resolvieron. Se han publicado pocos informes sobre los hallazgos en la CT en pacientes con fiebre tifoidea. Si bien la CT puede ayudar en el diagnóstico, es especialmente importante para identificar complicaciones de la fiebre tifoidea, como perforaciones, sangrado y formación de abscesos.

**Palabras clave:** Fiebre tifoidea; *Salmonella typhi*; Tomografía computarizada por rayos X (fuente: DeCS Bireme).

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## INTRODUCTION

Enteric fever refers either to typhoid fever, a clinical syndrome caused by *Salmonella enterica* subsp. *enterica* serovar Typhi, or paratyphoid fever, caused by *Salmonella* Paratyphi serotypes A, B and C. *S. Typhi* and Paratyphi A and B are host-restricted to humans <sup>(1)</sup>. In 2017, the global burden of typhoid fever was 10.9 million (95% confidence interval (CI) 9.3-12.6 million), resulting in 116,800 (95% CI 65,400-187,700) deaths. In the same year, South Asia reported the highest incidence rate of enteric fever of 549 (95% CI 481-625) cases per 100,000 person-years with 10.3 million (95% CI 9.0-11.7 million) cases (71.8% of global illnesses) predominantly in children <15 years of age <sup>(1)</sup>. The disease is endemic in South Asia (e.g., Pakistan, India, Nepal) and sub-Saharan African countries (e.g., Kenya, Burkina Faso, Ghana).

Although clinical symptoms are usually undistinguishable from other infectious diseases (e.g., malaria, dengue, Chikungunya, COVID-19, influenza, leptospirosis), the diagnosis in endemic low- and middle- income countries (LMIC) is based on serologic tests such as the Widal test despite its low performance (sensitivity range, 57%-74%; specificity range, 43%-83%) <sup>(2,3)</sup>. Blood culture is the gold standard for diagnosis; however, it is relatively costly, trained personal and laboratory capacity is required, and results usually take two to three days and can be false negative due to its poor reported sensitivity of 61% (95% CI 52%-70%) <sup>(4)</sup>.

In typhoid fever, the most common CT features are the presence of mesenteric lymphadenopathy, splenomegaly, circumferential small bowel, wall thickening, and free intraperitoneal fluid <sup>(5)</sup>. When these imaging findings are combined with clinical features, travel history to endemic areas, and presence of hepatic transaminitis, the diagnosis of typhoid fever should be considered <sup>(3)</sup>. Clinical manifestations of typhoid fever are not limited to the intestines, as affections in almost every systemic organ have been reported <sup>(6)</sup>. However, gastrointestinal complications are the most common due to the pathogenesis of the disease. The main site of establishment of *S. Typhi* is in the Peyer's patches of the small intestines. From there, it disseminates to the mesenteric lymphoid system and then passes into the bloodstream via the lymphatics <sup>(7)</sup>. Hepatic manifestations, such as hepatomegaly and elevated transaminases, are present in most patients <sup>(5)</sup>.

Few reports have been made about CT findings in patients with typhoid fever. While CT can aid in diagnosis, it is particularly important for identifying complications of typhoid fever such as perforation, bleeding and abscess formation <sup>(5)</sup>. The aim of this study was to discuss the CT findings of a case involving a male patient diagnosed with complicated typhoid fever.

## CASE REPORT

An 18-year-old male was admitted to our emergency department with a 21-day history of right-sided abdominal

pain, malaise, intermittent fever, watery diarrhea, headache, generalized weakness, and reduced appetite. Two days before being admitted, he developed jaundice, gross hematuria, frequent episodes of bloody diarrhea, and unintended weight loss. On examination, the patient exhibited jaundice, abdominal tenderness, and grade II hepatosplenomegaly. The general surgery service ruled out an acute abdomen.

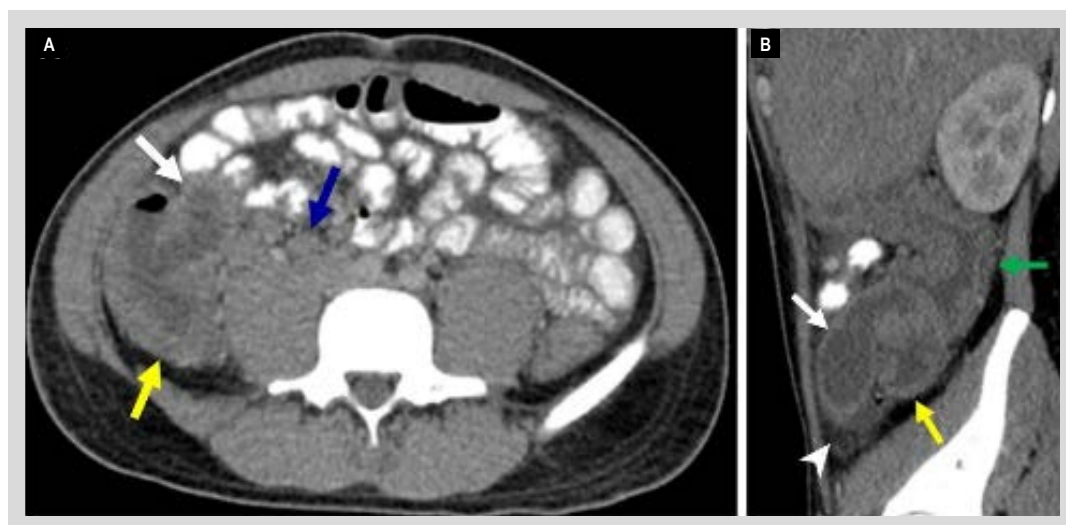
Initial blood tests showed pancytopenia, elevated direct bilirubin, high hepatic transaminase levels, normal alkaline phosphatase, acute kidney injury (AKI), and metabolic acidosis. Stool examination revealed leukocytes, suggesting inflammatory diarrhea. An abdominal ultrasound showed mesenteric lymphadenopathy. Contrast-enhanced abdominal computed tomography (CT) revealed non-specific thickening of the terminal ileum, cecum, and ascending colon, along with mesenteric lymphadenopathy and mesenteric fat inflammation (Figure 1, Panel A and B). Further tests for viral hepatitis, HIV, dengue, and leptospirosis were negative. A Widal test was positive for *Salmonella* Paratyphi A (1:160 dilutions), *S. Typhi* H (1:320 dilutions), and *S. Paratyphi* B (1:80 dilutions) antigens; and *Salmonella* Typhi was isolated from blood cultures. The *S. Typhi* isolate demonstrated susceptibility to ampicillin-sulbactam, cefepime, ceftazidime, ceftriaxone, ciprofloxacin, ertapenem, imipenem, meropenem, piperacillin-tazobactam, tigecycline; it exhibited resistance to amikacin, cefazolin, and gentamicin. Complicated typhoid fever was diagnosed, and ceftriaxone was initiated (initial dose of 2 gr intravenously every 12 hours, followed by a maintenance dose of 1 gr intravenously every 12 hours). After thirteen days, the patient's clinical condition improved and all symptoms resolved.

## Ethical consideration

The patient provided signed informed consent before reporting the case.

## DISCUSSION

A CT scan is a useful option especially for those with severe or prolonged typhoid fever when a complication is suspected. Findings in our case report align with the common ones reported in the literature, including circumferential bowel wall thickening of the terminal ileum, mesenteric lymphadenopathy, hepatosplenomegaly, and elevated transaminases <sup>(8)</sup>. One explanation for the thickening of the terminal ileum could be the bacterial-induced recruitment of lymphocytes and mononuclear cells in the Peyer's patches, which can eventually result in intestinal perforation or bleeding <sup>(2)</sup>. A review that included 42 studies— comprising observational studies, review articles and unique case reports—found that hepatomegaly was seen in 52% of patients. It also concluded that hepatosplenomegaly can be seen in 29-50% of patients <sup>(6)</sup>. Splenic sequestration due to an enlarged spleen in this patient could be the cause of leukopenia. Organomegaly could be explained by increased activity in both the liver and spleen <sup>(5)</sup>.



**Figure 1.** Axial (Panel A) and sagittal (Panel B) IV contrast-enhanced CT images through the abdomen show bowel wall thickening and enhancement of the distal ileum (yellow arrows), cecum (white arrows), and ascending colon (green arrow). Mesenteric adenopathy (blue arrow) and inflammation (white arrowhead) also are noted.

Enteric fever represents a significant public health risk, particularly in under-resourced nations. The swift and precise identification of the disease is a challenge in endemic LMICs due to the absence of reliable, inexpensive and user-friendly diagnostic tests<sup>(9)</sup>. Although CT scans do not play a significant role in diagnosing typhoid fever, a comprehensive and updated repertory of the epidemiology of these findings should be available in the literature. This can aid in identifying complications that may not be apparent at first sight.

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